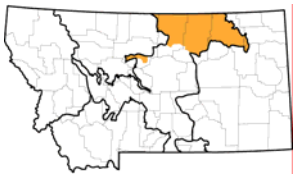
UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION



ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Sandy 10-14 inch p.z. (precipitation zone)

Site ID: R052XC212MT

Major Land Resource Area: 52XC – Central Glaciated Plains

Physiographic Features: This site usually occurs on undulating to rolling till plains, low terraces, fans and flood plains. Slopes vary from 0- 12%, but are usually less than 8%. Elevations generally range from 2,000 to 3,500 feet.

Land Form: (1) flood plain
(2) till plain
(3) terrace

	Minimum	Maximum
Elevation (feet):	1600	3500
Slope (percent):	1	12

Water Table Depth (inches):

Flooding:

Frequency:	None to rare
Duration:	Brief to none

Ponding:

Depth (inches):	NA
Frequency:	None
Duration:	None

Runoff Class: Low

Aspect: No significant influence

Climatic Features

A semi-arid, temperate climate characterizes the Glaciated Plains. The predominance of cool season species has evolved to take advantage of the precipitation regime that peaks in late spring-early summer (June). Seventy-five percent of the annual precipitation usually falls as steady, soaking, frontal system rains. Summer rains usually come with thunderstorms. Precipitation is the most important factor influencing production (Heitschmidt et al 2005). Severe drought occurs on average in two out of every ten years (Cooper, et al., 2001).

	Minimum	Maximum
Frost-free period (days):	96	118
32 F, 90% Probability = Minimum		
50% Probability = Maximum		
Freeze-free period (days):	120	142
28 F, 90% Probability = Minimum		
50% Probability = Maximum		
Mean annual precipitation (inches):	10	14

Climate Stations: (1) #241088 - Bredette
(2) #241722 - Chinook
(3) #243558 - Glasgow Airport
(4) #243910 - Harb
(5) #245572 - Medicine Lake
(6) #248939 - Whitewater

Influencing Water Features
This site is not influenced by water from wetlands or streams.

Representative Soil Features
These soils formed from alluvium or eolian deposits. The surface layer of these soils varies from 0-9 inches in depth and typically have a fine sandy loam or sandy loam texture. Underlying horizons often have silt loam, sandy loam, loam, sandy clay loam, loamy fine sand, and loamy sand textures. The depth of coarse textured soil needs to be 20 inches or greater. Soils are well to somewhat excessively drained. Permeability varies from very slow to moderately rapid. Soil ph varies from 6.6 to 8.4. The following soil components characterize this site: Glendive, Fortbenton, Chinook, Dooley, Parshall, Tally, Trembles, Busby and Kenilworth.

Predominant Parent Materials:
Kind: 1) sandstone & siltstone
Origin: 1) alluvium

Surface Texture: (1) fine sandy loam
(2) sandy loam
(3) coarse sandy loam
Surface Texture Modifier: (1) None

Subsurface Texture Group:
Surface Fragments < = 3" (% cover): 0
Surface Fragments >3" (% cover): 0
Subsurface Fragments < = 3" (% Volume): 0 – 9
Subsurface Fragments > 3" (% Volume): 0 – 2
Drainage Class: well to somewhat excessively
Permeability Class: very slow to moderately rapid

	Minimum	Maximum
Depth (inches):	20	> 72
Electrical Conductivity (mmhos/cm):	0	2
Sodium Adsorption Ratio:	---	---
Calcium Carbonate Equivalent (percent):	---	---
Soil Reaction (1:1 Water):	6.6	8.4
Soil Reaction (0.1M CaC12):		
Available Water Capacity (inches):	4	7

Plant Communities

Ecological Dynamics of the Site

This ecological site developed through time under the influence of climate, geologic parent materials, fire, plants and animals. Research consistently shows that precipitation is the principal factor altering productivity on ecological sites in the Northern Great Plains (Heitschmidt et al. 2005). The same authors concluded that grazing reduces herbage standing crop, whereas its effects on above ground net primary production varies with timing of grazing and precipitation events, along with the functional and structural composition of the plant community.

It is believed that, prior to the arrival of European man, fire occurred on 5-7 year interval (Frost 1998). These fires were ignited by lightning and by early man in his attempts to manipulate the environment. Clearly, the current role of fire on the Glaciated Plains is much reduced from its historical importance.

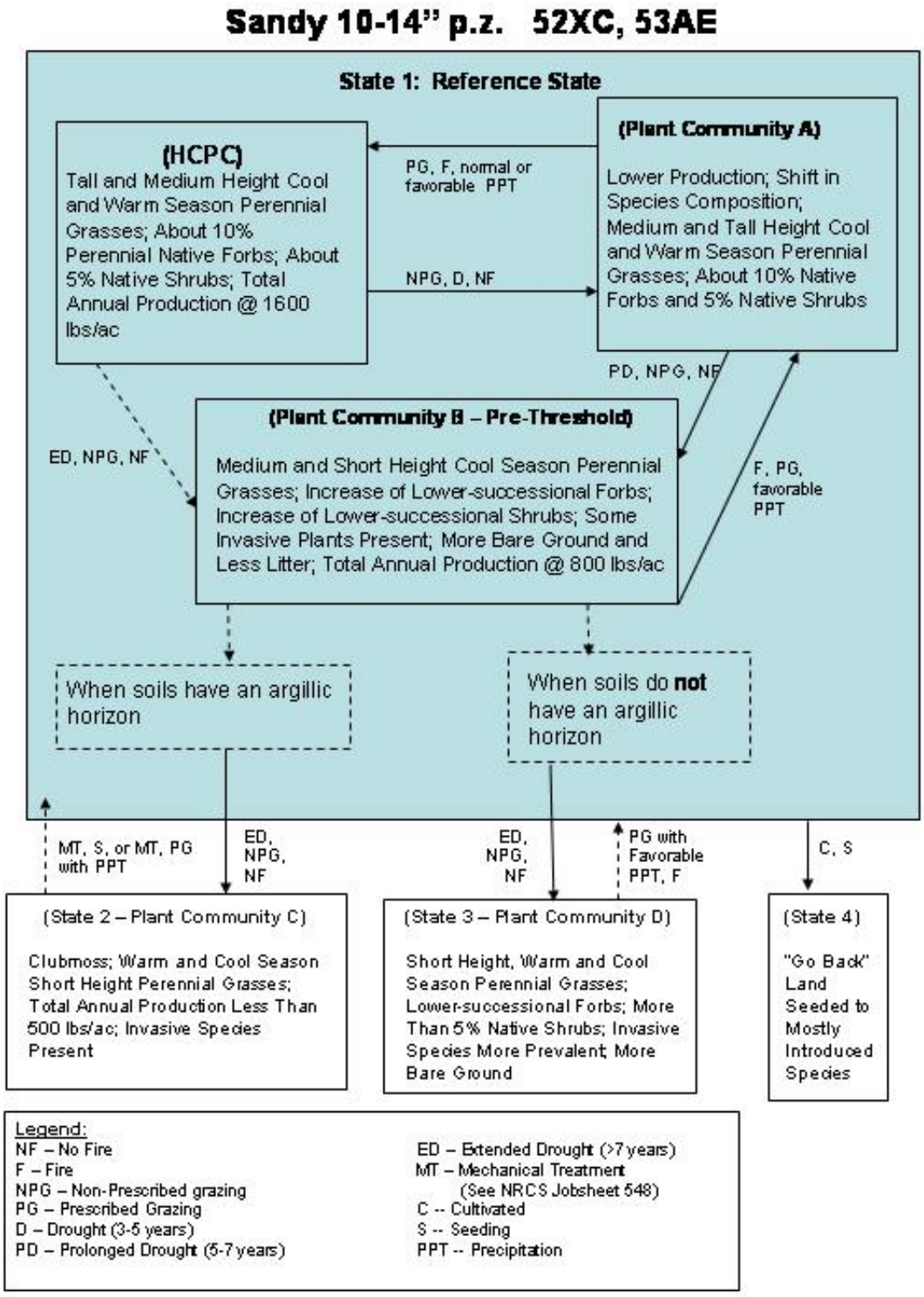
Plant community interpretations are based on the Historic Climax Plant Community (HCPC). The HCPC was determined by evaluating rangeland relic areas, and other areas protected from excessive disturbance. The HCPC is comprised of a mixture of cool and warm season perennial grasses, forbs and shrubs. About 85% of the annual production is from grasses and grasslike plants, most of which is produced during the cool season. Forbs and shrubs contribute 10% and 5%, respectively, to total annual production. Total annual production averages 1600 lbs/ac during normal years.

This site is moderately resistant and resilient to disturbances. Departures from the HCPC generally result from management actions, drought, a change in the natural fire regime, colonization and recruitment of noxious weeds, etc.. As the HCPC regresses to lower seral stages, the deep-rooted perennial grasses such as little bluestem and prairie sandreed are replaced by blue grama, sandberg bluegrass, fringed sagewort, scurfpeas, threadleaf sedge, hairy gold aster, green sagewort, and many flowered aster. In early seral stages, the dominance of these short grasses, warm season forbs and half-shrubs in the plant community disrupts ecological processes, impairs the biotic integrity of the site, and adversely affects resiliency. The site becomes more susceptible to erosion. The system's ability to recover to higher seral states is restricted or impeded.

State and Transition Diagram

Successional pathways of the Sandy 10-14" p.z. ecological site cannot be satisfactorily described using traditional theories of plant succession leading to a single climax community (Briske et al. 2005). This ecological site is more aptly described using state-and-transition vegetation dynamics in a non-linear framework. A "state" is an alternative, persistent vegetation community that is not simply reversible in the linear successional framework. States are depicted as seral stages, while pathways between states are "transitions." As the HCPC regresses to an early seral state, it is theorized that a threshold is crossed somewhere within the mid seral state. Plant communities occurring below this threshold are in a steady state. Transitions may be triggered by climatic events, fire, grazing, farming, burning, etc.

Three important plant communities and the successional pathways within the Reference State (State #1) are shown in the following diagram. In addition, transitions from Community B (State #1) to State #2 (Community C) and State #3 (Community D) are also illustrated. The diagram also depicts a third transition from State 1 (Reference State) to State #4. Ecological processes are discussed in the plant community descriptions, which follow the diagram.



State #1: Historic Climax Plant Community (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community (HCPC). Cool season tall and mid-grasses (such as prairie

sandreed grass, western wheatgrass, Indian ricegrass, bluebunch wheatgrass, and needleandthread grass) dominate the HCPC. These native, perennial grasses represent about 80% of the total annual plant production in the community. Little bluestem is uncommon on this site. Bluebunch wheatgrass is the dominant grass on this site.

Less common species in the HCPC include plains muhly, prairie junegrass, threadleaf sedge, plains reedgrass, sandberg bluegrass and blue grama. Dotted gayfeather, and purple and white prairie clovers are important warm season forbs. American vetch may be the most common cool season forb. The group of inconspicuous forbs that should be present in small amounts include scarlet globemallow, penstemon, manyflowered aster, erigeron, scurfpeas, and hairy goldenaster. Total forb production normally represents about 10% of the total annual production.

Silver sagebrush, yucca, prairie rose and western snowberry may occur in the HCPC. Overall, shrubs account for about 5% of the annual plant production.

Range inventory data collected (in 2001 and 2004) on the Fort Peck and Fort Belknap Indian Reservations indicate total above ground production varies from 1,270 to 2,550 lbs/ac. The latter inventory was conducted during a favorable precipitation period, which probably explains why the production is slightly higher than the 1600 lbs/ac which is normally expected on this site. Average annual production is expected to be slightly higher and lower than 1600 lbs/ac, respectively on more mesic and xeric portions of the Glaciated plains. During the inventories on the Reservations, similarity indices (SI) >75% were recorded within the HCPC.

This plant community is well adapted to the glaciated plains. Precipitation is the most important factor influencing production. The functional and structural diversity of plant species (perennials (with a few annuals and biennials), cool and warm season grasses, forbs and shrubs) optimize the capture of solar energy and maximize subsequent plant growth through the efficient use of available soil water and nutrient cycling. Following a disturbance which reduces the competitiveness of the species at HCPC, the taller, warm and cool season grasses (Indian ricegrass, bluebunch wheatgrass, western/thickspike wheatgrass) decrease. They are replaced by shorter height species such as needleandthread, blue grama, sand dropseed, and fringed sagewort. With further disturbance, annual bromes, wooly plantain, fluffgrass, and red threeawn become conspicuous. With proper grazing management and non-drought conditions, the HCPC species will replace these lower successional species within a few years.

Basal plant cover averages 35%. Litter is in contact with about 60% of the soil surface. Less than 5% of the soil surface should be bare, or unprotected by litter, rock, moss, and plant canopy. Bare ground should be less than 2 inches in diameter. Rills should not be present and water flow patterns should be barely observable.

(Insert HCPC Plant Community photo)

The major plant species composition and production by dry weight are shown for the HCPC in the following table. Total annual production has been derived from

several sources, and has been adjusted to represent a typical annual precipitation cycle.

Historic Climax Plant Community Plant Species Composition:

GRASSES /GRASSLIKE

85% of Community

Common Name	Scientific Name	Group	Group Allowable Pounds Per Acre Low	Group Allowable Pounds Per Acre High	Annual Production in Pounds Per Acre Low	Annual Production in Pounds Per Acre High
Prairie sandreed	*Calamovilfa longifolia*				320	640
Little bluestem	*Schizachyrium scoparium*				50	100
Indian ricegrass	*Achnatherum hymenoides*				80	320
Sideoats grama	*Bouteloua curtipendula*				0	240
Bluebunch wheatgrass	*Pseudoroegneria spicata*				100	320
Green needlegrass	*Nassella viridula*		*80 lbs/ac is max		0	80
Western wheatgrass	*Pascopyrum smithii*	1	allowed for all		80	160
Thickspike wheatgrass	*Elymus macrourus*	1	species in Group; No		80	160
Needle and thread	*Hesperostipa comata*		more than 20 lbs		240	400
Threadleaf sedge*	*Carex filifolia**		for any one species.		0	80
Sandberg bluegrass*	*Poa secunda**				0	80
Praire junegrass*	*Koeleria macrantha**				0	80
Blue grama*	*Bouteloua gracilis**				0	80
Plains reedgrass*	*Calamagrostis montanensis**				0	80
Other native grasses*					0	80

FORBS

10% of Community

Common Name	Scientific Name	Group	Group Allowable Pounds Per Acre Low	Group Allowable Pounds Per Acre High	Annual Production in Pounds Per Acre Low	Annual Production in Pounds Per Acre High
Dotted gayfeather	*Liatris punctata*				16	80
Purple prairie clover	*Dalea purpurea*	2	32	160	16	80
White prairie clover	*Dalea candida*	2			16	80
American vetch	*Vicia americana*				16	80
Missouri goldenrod*	*Slidago missouriensis**				16	80
Western yarrow*	*Achilea millefolium**				0	80
Manyflowered aster*	*Symphyotrichum ericoides**		160 lbs/ac is		0	80
Scarlet globemallow*	*Sphaeralcea coccinea**		maximum allowed		0	80
Scurpea*	*Psoralidium spp.**		for all forbs.		0	80
Hairy goldenaster*	*Heterotheca villosa**				0	80
Prairie coneflower*	*Ratibida columnifera**				0	80
Green sagewort*	*Aetemisia dracunculus**		*No more than 80		0	80
Prairie thermopsis*	*Thermopsis rhombifolia**		lbs/ac for all species		0	80
Milkvetch*	*Astragalus spp.**		in this group; and no		0	80
Penstemon*	*Penstemmon spp.**		more than 20 lbs for		0	80
Hoods phlox*	*Phlox hoodii**		any one species.		0	80
Eriogonum*	*Eriogonum spp*.*				0	80
Dense clubmoss	*Selaginella densa*				0	T
Other native forbs*					0	80

SHRUBS AND HALF-SHRUBS

5% of Community

Group Allowable	Annual Production

Common Name	Scientific Name	Group	Pounds Per Acre		in Pounds Per Acre	
			Low	High	Low	High
Winterfat	*Krascheninnikovia lanata*				16	80
Snowberry*	*Symphoricarpos spp.**				15	80
Rose*	*Rosa spp.**		80 lbs/ac is the max		16	80
Rubber rabbitbrush*	*Ericameria nauseosa**		allowed for all shrubs		16	80
Silver sagebrush*	*Artemisia cana**		*60 lbs/ac is max for		16	80
Fringed sagewort*	*Artemisia frigida**		total of all species in		16	80
Other native shrubs*			group; No more than		16	80
Plains pricklypear	*Opuntia polyacantha*		25 lbs/ac for any one		0	T
			species.			

Structure and Cover

Soil Surface Cover (%)

Basal Cover				Non-Vascular Plants	Biological Crust	Litter	Surface Fragments >1/4 & <= 3"	Surface Fragments > 3"	Bedrock	Water	Bare Ground
Grass/ Grasslike	Forb	Shrub/ Vine	Tree								
25-30	T-5	T-2	0								

Ground Cover (%)

Vegetative Cover						Non-Vegetative Cover					
Grass/ Grasslike	Forb	Shrub/ Vine	Tree	Non-Vascular Plants	Biological Crust	Litter	Surface Fragments >1/4 & <= 3"	Surface Fragments > 3"	Bedrock	Water	Bare Ground
				0-5	0-2	60	0-3	0-T	0	T	0-T

Structure of Canopy Cover (%)

	Grass/Grasslike	Forb	Shrub/Vine	Tree
<= 0.5 feet	10	40	20	0
>0.5 - <=1 feet	30	50	40	0
>1 - <=2 feet	40	8	30	0
>2 - <=4.5 feet	20	2	10	0
>4.5 - <=13 feet	0	0	0	0
>13 - <= 40 feet	0	0	0	0

Annual Production by Plant Type:

Plant Type	Annual Production (lbs/AC) Low	RV*	High
Grasses /Grasslike	840	1360	1750
Forb	110	160	150
Shrub/Vine	50	80	100
Total	1000	1600	2000

*RV means "representative value".

*Successional pathway from HCPC to Community A (State #1):

Successional pathways from the HCPC are influenced by frequency, timing and intensity of grazing, amount and timing of precipitation, fire, insect infestations, colonization and recruitment of noxious weeds, etc. As communities regress from HCPC, short warm and cool season grasses increase at the expense of mid and tall cool season grasses.

Plant Community A (State #1):

Total plant production averages about 1200 lbs/ac in this Plant Community, or 75% of the production at the HCPC. Production of the tall, cool and warm season perennial bunchgrasses (green needlegrass, and bluebunch wheatgrass) decreased from the HCPC. In contrast, production of the medium height rhizomatous western/thickspike wheatgrasses and the lower-successional needleandthread grass increased. In comparison to the HCPC, the relative production of short height grasses and sedges such as blue grama, prairie junegrass, plains reedgrass and threadleaf sedge increased to about 20% of the total plant production. Sand dropseed may show up in some communities. Exact response by these species varies with the kind of disturbance (drought, grazing, etc.) and with precipitation (amount and timing).

Native forb production continues to account for about 10% of the total production. However, scurfpeas and hairy goldenaster increase at the expense of the prairie clovers and American vetch. Shrubs account for less than 10% of the total production. However, the half-shrub fringed sagewort often increases. These increases following disturbance are due to enhanced growth of established plants and seedling recruitment. Not only do individual plants that survive the disturbance grow bigger and produce more seed, but seed is dispersed beginning in summer and continued through the winter (Bai and Romo 1997). SI indices from 55-75% are associated with this community. Litter cover decreases to 50% and bare ground increases to 5-10%. In contrast to the HCPC, range conservationists have slight to moderate concerns regarding plant functional/structural group shifts, decreasing amount of litter, and increased presence of lower successional plants.

(Insert Plant Community A photo)

***Successional Pathway from Community A to HCPC:**
Plant Community A is resilient. Successional processes can return Plant Community A to the HCPC. The process is facilitated by prescribed grazing, the incorporation of the natural fire regime into the system, and by normal precipitation.

***Successional Pathway from Community A to Community B:**
Prolonged drought, non-prescribed grazing, and the continued absence of fire in the system causes retrogression to Community B. The effects of drought and poor grazing management are readily apparent with careful observation.

Plant Community B (State #1):

Plant Community B is dominated by a mix of cool and warm season perennial grasses such as needleandthread, western/thickspike wheatgrass, blue grama, plains reedgrass, prairie junegrass and upland sedges. Only a few individual plants of bluebunch wheatgrass, green needlegrass and little bluestem remain in

the Community. The short grass and grasslike plants make up more than 30% of the total production. Total vegetative production declines to about 900 lbs/ac in a normal year.

Hairy goldenaster, scarlet globemallow, scurfpeas and other warm season forbs increase at the expense of the prairie clovers and American vetch. Green sagewort and fringed sagewort, a half-shrub, increases at the expense of winterfat and other desirable forage species. Forbs and shrubs, respectively account for more than 10% and 5% of the total plant production. SI indices for this community vary from 45-55%.

Plant basal cover varies from 20-25%. Litter provides cover for about 35-40% of the ground, while bare ground increases to 10-15%. An examination of the soil surface suggests that there is inadequate regeneration of desired species, inadequate vigor of key species, and possible increases in amount of bare ground.

Plant Community B is fairly resilient, but it is not highly resistant to disturbance. It is the "pre-threshold" community. Therefore, it is critical that this community be recognized and strategies implemented to prevent further regression. Community B can readily regress to a lower state, from which succession back to the HCPC community or Plant Community A would be restricted.

(Insert Plant Community B photo)

***Successional Pathway from Community B to Higher Communities:**
Favorable precipitation, prescribed grazing and a normal fire regime are normally required for succession to higher communities (HCPC and/or Plant Community A). Management strategies should focus on proper utilization and grazing deferment to increase vigor and seed production of desirable plants, and to increase litter cover.

***Transition from Community B to State #2 or State #3:**
Any combination of extended drought, non-prescribed grazing and unfavorable climatic patterns can cause regression from Plant Community B to lower States. Soil scientists have observed that the presence of an argillic horizon in the soil will normally result in State #2. When soils do not have an argillic horizon, regression usually leads to State #3. These relationships may not occur in all communities or locations (Van Dyne and Vogel 1967).

Plant Community C (State #2):

Community C occurs on this site when there is an argillic horizon present. Clubmoss, blue grama, prairie junegrass, sandberg bluegrass, and other short grasses dominate this community. Although some western wheatgrass persists as single shoots with few seedstalks, it is difficult to find green needlegrass, little bluestem and bluebunch wheatgrass. Japanese brome and cheatgrass often occur in this community.

Wooly plantain, hoods phlox, hairy goldenaster and western yarrow are common forbs. Fringed sagewort (a half-shrub) usually increases while the shrubs decrease in abundance. Total vegetative production averages about 550 lbs/ac.

Dense clubmoss was present at 50% of the data collection plots located on the Sandy Site during the range inventories on the Fort Peck and Belknap Reservations in 2001-2004. In some cases, it formed a mat-like carpet with 20-70% ground Cover. The presence of clubmoss on these sites is indicative of an argillic horizon. There are very few seedlings of desirable species emerging through the clubmoss. Some researchers hypothesize that this is due to an inadequate seedbank (Romo and Bai 2004). SI indices of less than 25% are associated with Community C.

Soil erosion is normally not a serious problem because of the cover provided by clubmoss. However, NRCS specialists often reported that they were concerned about inadequate litter, slight surface erosion by water, and noxious plants. The clubmoss disrupts the hydrologic cycle (capture, storage and redistribution of precipitation) by impeding infiltration and percolation. Less vegetative growth is available for transfer to litter, and nutrient cycling is delayed or impeded.

In comparison to the State #1 communities, State #2 is less efficient in capturing solar energy and converting it to carbohydrates for plant growth. The absence of tall and mid cool season perennial grasses, plus the shift from cool season plants to warm season plants, indicates that the structural and functional processes of the site have been disrupted.

(Insert Plant Community C photo)

Plant Community D (State #3):

Plant Community D occurs on soils that do not have an argillic horizon. This Community is dominated by blue grama, prairie junegrass, sandberg bluegrass, threadleaf sedge, and other short grasses and grass-like plants. Western wheatgrass and needleanthread are minor components of the community.

Clubmoss is present on many sites, but is much less dominant than in State #2. Hoods phlox, wooly plantain, hairy goldenaster, cudweed sagewort, and scarlet globemallow are common forbs. Fringed sagewort is a common half-shrub. Broom snakeweed and prickly pear cactus increase in response to the more xeric environment (less plant cover, less litter, more evaporative losses, lower humidity, etc.). Total vegetative production averages about 650 lbs/ac. SI indices of 15-35% are associated with this community.

In contrast to communities in State #1, range conservationists express moderate to extreme concerns about plant community composition, functional/structural groups, litter, annual production, and invasive plants. Each of the primary

processes: 1) hydrology (the capture, storage and redistribution of precipitation), 2) energy capture (conversion of sunlight to plant and animal matter), and 3) nutrient cycling (the cycle of nutrients through the physical and biotic components of the environment) has been degraded beyond the point of self-repair within a reasonable length of time and without external inputs of energy. For example, when tall, high producing, perennial grasses are replaced by short grasses (blue grama, clubmoss and prairie junegrass), the abilities of the plant community to maximize the conversion of solar energy to plant biomass and efficiently utilize available precipitation are impaired. Less solar energy is captured and converted to plant carbohydrates. Plant productivity declines, and there are fewer plants and less litter to protect the soil. As bare ground increases, infiltration decreases and/or surface runoff and soil evaporation increases. Because ecological processes of the site are no longer balanced and sustained, shallow rooted, warm season species continue to gain a competitive advantage over the tall, deep rooted, perennial species. The biotic integrity of the site is degraded. Thus, the regression from Community B to either State #2 or State #3 crosses a threshold. Thresholds are defined as a point in space and time at which one or more of the primary ecological processes responsible for maintaining the sustained equilibrium of the state degrades beyond the point of self-repair.

(Insert Plant Community D photo)

***Transition from States #2 and #3 to State #1:**
The implementation of prescribed grazing, re-implementation of the natural fire regime and a favorable precipitation pattern normally will not induce succession from States #2 and #3. Succession from these States back to State #1 usually requires a significant input of energy.

Mechanical treatments are often used to induce and facilitate succession on this ecological site. Mechanical treatments should not be used on slopes greater than 10% (See NRCS Conservation Practice 548). Although seeding normally is not recommended following a mechanical treatment, the absence of key species may make it necessary to seed following treatment in State #2. Because wind erosion is a concern, a long-term comprehensive management plan is essential to the successful management of these states. Without adequate grazing deferment following treatment and a prescribed grazing plan, the desired effects of mechanical treatment will not be achieved. Failure to follow a comprehensive plan may result in economic losses (Kulshreshtha et al 2002). Although Kulshreshtha et al concluded that mechanical treatments were not economically feasible in Saskatchewan, experience along Montana's Highline suggests otherwise. With prescribed grazing and plant succession, the effective life of treatment should be greater than 10 years (life expectancy used by researchers).

Range seeding is usually not necessary following mechanical treatment of State #3. The number of desired plants (and seed) is usually adequate to facilitate succession.

The necessity of proper management should not be overlooked on this productive ecological site. Research has documented succession occurring, during favorable precipitation cycles, in many Northern Great Plains plant communities. Experience indicates that fire (if there is adequate fuel) reduces clubmoss cover. At locations where the surface soil is intact and has not been adversely impacted by erosion, prolonged favorable climatic conditions combined with proper management may induce succession from Plant Communities C and D across the threshold (to State #1). It is theorized that the significant input of energy that is normally required to move succession across a threshold may not be needed.

"Go Back Land" (State #4):

More than a million acres of former cropland in the Glaciated Plains are seeded to introduced and native species. These seedings resulted from Society's concerns regarding land stewardship and erosion, and have been largely funded by the Federal Government. The government programs have spanned from the 1940's (Bankhead Jones Act) to the present (Conservation Reserve Program-CRP).

Crested wheatgrass was the primary species seeded under the direction of the Bankhead Jones Act. Crested wheatgrass, intermediate and pubescent wheatgrasses, smooth bromegrass, and some native grasses were seeded during the Soil Bank Programs of the 1960-1970 era. Both introduced and native species were seeded during the CRP program (1985-present). There are over 220,000 acres of CRP in Valley County alone.

The future of these "go back lands" is not predicted in the state and transition model. Depending on government programs and agricultural prices, these lands could stay in permanent vegetation with limited haying and grazing, be fully used as pasture for grazing livestock, or be converted to cropland.

(Insert State #4 photo)

Ecological Site Interpretations

Animal Community

Livestock Management

This site evolved with trampling and defoliation (bison, elk, deer, antelope, prairie dogs, grasshoppers, jackrabbits, and other herbivores), fire and drought. The site is highly resistant to disturbances which may alter its ecological processes. It is also resilient. Following perturbations such as drought, which allows blue grama and other increasers to increase at the expense of the mid and tall grasses, succession occurs with subsequent rainfall. Thus, the HCPC, or Communities A or B may be present at any given time in State #1. The site has the potential to produce 1,600 lbs/ac.

Forage production shows far greater variations in response to changes in annual precipitation than to different grazing intensities (Heitschmidt et al. 2005). However, proper stocking rates and prescribed grazing is needed to ensure that the site remains in State #1. Without proper grazing management the mid-to-tall grass community will regress to a blue grama, prairie junegrass, dense clubmoss community. In comparison to the HCPC, suggested stocking rates for communities in States #2 & #3 represent a 4-fold reduction. Experience indicates that prescribed grazing prevents further deterioration in States #2 & #3. However, prescribed grazing normally will not guarantee significant plant succession (in States #2 & #3) unless the clubmoss and blue grama sod is reduced by mechanical treatments. Very few livestock losses are reported from poisonous plants.

Wildlife Interpretations

The Sandy 10-14" p.z. ecological site that is in a high seral state or HCPC (State #1) provides forage for mule deer and antelope during most of the year. However, the overall forage potential is limited by the relatively low production and diversity of forbs and shrubs. Low shrub cover also limits the potential of the site for thermal and escape cover. Most deer use occurs along the edges of the site where it borders woody draws, badland range sites, etc.

Species diversity and cover associated with either the high seral or HCPC states also provide habitat for sharp-tailed grouse and other upland birds. Most wildlife usage occurs along the transitions between the sandy site and woodland draws. The relative absence of big sagebrush and silver sagebrush limits the potential of this site for sage grouse habitat.

Species diversity and litter also provide favorable habitats for deer mice, rabbits and other small mammals. Golden eagles, redtail and ferruginous hawks are often circling over the landscape searching for prey.

Communities that are in States #2 and #3 are much less suitable for big game, upland birds and most species of small mammals. However, they are more suitable for prairie dogs. Prairie dog towns also have potential for use by burrowing owls, mountain plovers, and other wildlife species. Lands in State #4 that were seeded under the CRP program provide valuable forage and cover for upland birds, deer and antelope,

Plant Preferences by Animal Kind

Refer to NRCS Field Office Technical Guide, Section IIE, General Information, for tables displaying plant preferences by livestock and wildlife.

Hydrology Functions

Soils associated with this ecological site are mostly in Hydrologic Soil Group B (with a few in Groups A and C). Infiltration rates are generally moderate. The runoff potential is also low to moderate, depending on slope and ground cover.

Good hydrologic conditions exist on plant communities that are either in a high seral state or are at HCPC (State #1). Canopy cover (grass, forbs and shrubs) is

greater than 90% in these communities, which is conducive to high infiltration rates and minimizes runoff and erosion.

Communities in early seral states (States #2 and #3) are generally considered to be in poor hydrologic condition. Concerns are valid. The dense clubmoss and blue grama restrict the ability of the desirable tall and mid-grasses to utilize available moisture. Although erosion is probably minor at locations where the site produces mid and tall, cool-season grasses, or a dense clubmoss and bue grama, wind and water erosion is a major concern when the amount of bare ground exceeds litter. Excess bare ground results when States #2 and #3 have been subjected to excessive grazing by livestock, prairie dogs, insects, extreme drought or wild fire.

Recreational Uses

Hunters are probably the most common recreational user of this ecological site. The site is also used by hikers and photographers. Many "classy" photographs of the Northern Great Plains exploit the stark and contrasting beauty of yuccas, little bluestem and/or prairie sandreed.

Wood Products

This site has no significant value for wood products.

Other Products

This site is suitable for livestock grazing from May through October. Because tall and mid grasses comprise about 85% of the production, the site is better-suited for cattle, rather than sheep grazing.

Other Information

The Sandy 10-14" p.z. ecological site in the central Glaciated plains is resistant to perturbations. However, the site loses its resiliency when the plant community regresses from a high to an early seral state. As the site moves from HCPC to lower seral communities, reproductive capability of the higher successional plants is restricted. Annual production in early seral states is less than 25% of the sites' potential, which adversely affects amount of litter and the number of structural/functional plant groups.

Supporting Information

Associated Sites The following sites may be found in association with the Sandy 10-14" p.z. ecological site. The Site ID indicates in which Rangeland Resource Units (RRU) these sites occur. For example, Site ID R052XC205MT occurs in RRU 52XC.

Site Name	Site ID	Site Narrative
Clayey 10-14" p.z.	R052XC205MT	Similar landscape position; different species composition and soil texture.

Silty 10-14" p.z.	R052XC217MT	Similar landscape position, different species composition and soil texture.
Silty-Steep 10-14" p.z.	R052XC203MT	Slopes >15%; less forage production; different species composition.
Overflow 10-14" p.z.	R052XC207MT	Receives additional run-in moisture from surrounding landscape; different species composition, higher productivity.
Shallow 10-14" p.z.	R052XC214MT	Soil depth less than or equal to 20 inches to a restrictive layer; less forage production.

Similar Sites

Site Name	Site ID	Site Narrative
Sandy 10-14" p.z.	R053AE062MT	Little bluestem replaces bluebunch wheatgrass.

State Correlation
This site has been correlated with the following states: Montana

Inventory Data References

Data Source	Number of Records	Sample Period	State	County
SCS-Range-417	7	2002	MT	Roosevelt
ECS-1				
Modified Double Sampling	6	2001-2004	MT	Blaine, Roosevelt, Sheridan, Phillips, Valley

USDA-SCS-MT (1981) Technical Range Site Description

Type Locality
State: MT
County:
Township:
Range:
Section:
UTM: Datum: NAD__ _____E ____N
General Description:
Sensitivity: Yes___ No___

Type Locality
State: MT
County:
Township:
Range:
Section:
UTM: Datum: NAD__ _____E ____N
General Description:

Sensitivity: Yes___ No___

Relationship to Other Classifications:

Other References

Bai, Yuguang, and J. T. Romo. 1997. Seed production, seed rain, and the seedbank of fringed sagebrush. J.. Range Manage. 50:151-155.

Briske, D. D., S. D. Fuhlendorf, and F. E. Smiens. 2005. State-and-transition models, thresholds, and rangeland health: a synthesis of ecological concepts and perspectives. Rangelands Ecol. Manage. 58:1-10.

Frost, Cecil C. 1998. Presettlement fire frequency regimes of the United States: a first approximation. Pages 70-81 in Teresa L. Pruden and Leonard A. Brennan (eds.). Fire in ecosystem management: shifting the paradigm from suppression to prescription. Tall Timbers Fire Ecology Conference Proceedings, No. 20. Tall Timbers Research Station, Tallahassee, Fl.

Heitschmidt, R. K., K. D. Klement, and M. R. Haferkamp. 2005. Interactive effects of drought and grazing on Northern Great Plains rangelands.Rangeland Eco. Manage. 58:11-19.

Kulshreshtha, S. N., J. T. Romo, and Peng Hongjia. 2002. Economic analysis of mechanically disturbing rangeland to reduce clubmoss in Saskatchewan. Can.J. Plant Sci. 82:739-746.

Romo, J. T., and Y. Bai. 2004. Seed bank and plant community composition, mixed prairie of Saskatchewan. J. Range Manage. 57:300-304.

USDA NRCS. 1997. National Range and Pasture Handbook.

Van Dyne, G. M., and W. G. Vogel. 1967. Relation of Selaginella densa to site, grazing, and climate. Ecol. 48:438-444.

Site Description Revisions

The 2005 Sandy 10-14" p.z. ecological site description replaces earlier dated versions of the Sandy 10-14" p.z. description in Rangeland Resource Unit 52XC. This 2005 revision incorporates the State and Transition Model theory, additional data on site productivity, and an improved understanding of many rangeland health indicators.

Site Description Approval

This ecological site description is approved with the understanding that it is no more than another step in our continual effort to update the NRCS technical guide. In order to facilitate the process, NRCS field personnel are encouraged to forward existing information and/or new data that can be used to improve the utility of this site description. Please forward the information and data to the State Rangeland Management Specialist.

Authors	Date	Approval	Date
Dr. John Lacey	02/28/2005	Loretta J. Metz	03/19/2005

Maxine Rasmussen, Area RMS, Glasgow, MT
Jon Siddoway, Area RMS, Great Falls, MT
Rick Bandy, Area RSS, Great Falls, MT
Greg Snell, Area RSS, Glasgow, MT